(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 695 214 B1

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
08.10.1997 Bulletin 1997/41

(21) Application number: **94915525.3**

(22) Date of filing: **19.04.1994**

(51) Int. Cl.[6]: **B01J 2/16**, B01D 46/42

(86) International application number:
PCT/EP94/01219

(87) International publication number:
WO 94/23831 (27.10.1994 Gazette 1994/24)

(54) PLANT FOR TREATING POWDERS OR GRANULES

ANLAGE ZUR BEHANDLUNG VON PULVERFÖRMIGEM ODER KÖRNIGEM MATERIAL

INSTALLATION DE TRAITEMENT DE POUDRES OU DE GRANULES

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **20.04.1993 IT MO930055**
20.04.1993 IT MO930056

(43) Date of publication of application:
07.02.1996 Bulletin 1996/06

(73) Proprietor: **ICO OLEODINAMICI S.P.A.**
I-41010 San Damaso (IT)

(72) Inventors:
- **NORA, Andrea**
  I-41100 Modena (IT)
- **BARANI, Ruggero**
  I-41100 Modena (IT)

(74) Representative: **Gotra, Stefano**
BUGNION S.p.A.
No. 25, Via Emilia Est
41100 Modena (IT)

(56) References cited:
WO-A-88/01904
DE-A- 2 643 121
US-A- 4 027 624
US-A- 4 723 971

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 695 214 B1

Printed by Rank Xerox (UK) Business Services
2.14.15/3.4

Description

The state of the art comprises silos, generally cylindrical in shape, for the storage of powdery or granular materials, such as, for example, cement, flour, cereals or other substances, that have, on their top side, filter units through which, during the filling phase, a current of pressurized air containing the material that is to be placed in the silo is made to pass, using the known techniques of pneumatic transportation of loose products.

The state of the art also comprises plant for the agglomeration of powdered materials consisting of an agglomeration chamber, the sides of which are made up of a cylindrical casing, with, at its lower end, a detachable basket, fixed with a sealing coupling, that contains the material to be agglomerated; a dispenser for atomized binding liquid is positioned inside the agglomeration chamber, to spray the product for a predetermined interval of time, depending on the dimensions of the granules required and on the type of product: the product is sprayed when a stream of heated air is forced upwards through the perforated basket, causing it to be blown around inside the chamber; the air is then made to pass through filter units positioned at the top end of the agglomeration chamber for its subsequent expulsion into the atmosphere (see US-A-4 027 624).

With both the ensilation plants and the powder or granule agglomeration plants, however, the substitution and cleaning of the filter units is a somewhat awkward and onerous operation.

In fact, the task involves the operator, after having lifted the closing cover, or cap, accessing a support plate for the filters from above in order to remove them, lowering them and subsequently cleaning them; alternatively, when the said support plate is fixed to the casing itself, and it being possible to remove the filters from below the support plate, the operator, whilst being facilitated in the removal of the filters, is unable to avoid the precipitation of the residue filtered out by the filters; this signifying that the operator is inevitably contaminated with the product, which can sometimes represent a health hazard, especially in the case of powders used in the preparation of chemical or pharmaceutical substances.

Furthermore, in the case of the agglomeration plants, the centering of the basket in relation to the bottom edge of the agglomeration chamber is extremely precarious, consequently requiring expensive and encumbering auxiliary centering mechanisms in order to prevent the powder from escaping.

The state of the art also involves agglomeration methods in which a heated stream of air is passed upwards through the powder, causing it a substantially vertical fluctuating motion, or fluidizing it, inside an agglomeration chamber; above the fluctuating mass, or liquid bed, a binding liquid is atomized which agglomerates the particles of powder by hydrating the granules by their coalescing with nuclei of larger dimensions, formed at random inside the fluctuating mass; the supply of the atomizing liquid being interrupted after e set time, proportional to the dimensions of the agglomerated particles required.

The flow of heated air is generally only interrupted after another set interval of time has passed sufficient to dry out the agglomerated particles: in this way unwanted sticking together of damp particles that would give rise to uncontrolled variations in the dimensions of the resulting product is avoided. At the end of the drying phase , the product is extracted from the agglomeration chamber and the cycle is repeated with the successive load of powder; alternatively, if the size of the granules needs to be increased beyond that which is obtainable in a single agglomeration cycle, the granules are once again blasted by the stream of heated air and sprayed with the atomized binding liquid until the desired dimensions are achieved whereupon they are dried and extracted.

Moreover, in the traditional procedures, the various phases are regulated by means of manual intervention on the controlling mechanisms for the liquid and air flows, particularly in the variation of the corresponding flow sections; this results in a high degree of imprecision of control, considerable losses, high possibility of errors, especially with complex cycles, in which, in other words, there are a considerable number of phases of not necessarily constant duration, low degrees of repeatability with, consequently, undesirable variations in the quality of the product.

Furthermore, the interruption of the flow of binding liquid, an operation of the utmost importance that prevents the supply of a damaging excess of liquid that would cause an undesired increase in the size of the granules, if not even the formation of a compact cake, and consequently a high incidence of rejects, can only be achieved, with the required reliability, with the closure of the flow section of the atomizer nozzle by means of a costly and complex pin shutter: this involves a considerable increase in costs and high risk of jamming.

The fluidized powders, moreover, especially with reduced loads with respect to the capacity of the agglomeration chamber, encroach the area taken up by the filter units, causing them to become rapidly clogged, consequently requiring more frequent cleaning, involving in each case the interruption of the cycle.

Finally, operation of the plant requires the more or less constant attendance of an operator who, as well as being specialized, is extremely sensitive to corrective interventions, even improvised, to the procedural parameters, particularly during the setting up phases for the agglomeration of new products.

Such prior art may be subject to considerable improvements with a view to eliminating the said drawbacks.

From the foregoing emerges the need to resolve the technical problem of inventing a container for powders or granules, to be inserted in a plant for the agglomeration of powders, in which it is possible to substitute the filter units without the operator having to per-

form dangerous operations at elevation, avoiding also contamination with the product in question; furthermore, inventing a container to be inserted in a plant for the agglomeration of powders in which it is possible to centre the basket at the base of the casing of the agglomeration chamber automatically, or, in any case, without requiring laborious operations; this in a safe manner and with contained costs.

The invention resolves the said technical problem by adopting a plant for the treatment of powders including a container that is prevalently vertical in extension, having an intermediate tubular portion, coupled to a base structure functioning as underside and to a cover having filter units for the transportation, or processing, of air; the casing of the intermediate portion of the container being supported in such a way so that it may rotate on a horizontal axis, so that it is possible, in the configuration whereby it is disconnected from the base and the cover, to rotate it through an angle of approximately 180° around the said axis, so as to overturn the said intermediate portion to a point where the end section that couples with the cover is positioned at a height that enables access for an operator on the ground or possibly on a platform.

The base structure, or basket, being preferably in the form of a truncated cone diverging upwards, being such that it may be coupled to a mobile support trolley by means of at least one pair of hinges, advantageously aligned, resting on opposing arms of the said trolley in such a way that the base structure may be angled at will with respect to a horizontal plane.

The interruption of the flow of binding liquid is advantageously achieved, without dripping, with the inversion of the direction of flow of the liquid in a portion of the supply tube from the corresponding supply pump and the outlet section of the atomized liquid dispenser.

Alternatively, the interruption of the flow of binding liquid can be achieved with the redirection of the said fluid to the tank, with possibly the simultaneous closing of the outlet section of the atomized liquid. Said closure can be achieved with the activation of a one-way flow interceptor valve.

Control means for controlling the value of the pressure in the agglomeration chamber may be achieved with the generation of an electrical signal proportional to the pressure in the agglomeration chamber which is sent to an electronic processor, which, on confrontation with a predetermined limit value, emits an electrical signal that pilots the angular velocity of the air circulation fan.

Some of the advantages offered by the present invention are: the possibility of substituting the filter units from the ground by overturning the intermediate portion of the silo, or container in general, avoiding dangerous operations at height of the operator, avoiding also contamination from the product being processed; improved centering of the basket on the lower edge of the agglomeration chamber; improved safety and lower costs; operation of the plant without the presence of a highly specialized technician having also high degree of sensibility for the corrective and distributive parameters; high degree of precision in the variation of the air flow for the formation of the fluid bed and of the flow of binding liquid, with highest levels of repeatability, even for complex cycles, that is, consisting of a considerable number of heating, agglomeration and drying phases, however coordinated with one another and having durations that are not necessarily constant; increase in the quality of the product; considerable reduction in the risk of the binding liquid dripping with, consequently, the elimination or drastic reduction in the quantity of rejects; contained costs; possibility of application in any vertical fluid bed agglomeration plant.

Some embodiments of the invention are illustrated, by way of example and with non-limiting reference to a powder agglomeration plant, in the 19 tables of drawings attached, in which: Figure 1 is a diagram for the implementation of a method of agglomeration for the plant as in Tables 2 to 16; Figure 2 is the front view of the agglomeration plant; Figure 3 is the side view of Figure 2; Figure 4 is the plan view of the plant of Figure 2; Figure 5 is the side view of the plant of Figure 2, but with the cover, or cap, raised for the substitution of the bag filters and with the trolley with basket displaced laterally; Figures 6, 7 illustrate the raising and lowering device of the cap; Figure 8 is the side view of the plant with the container in an overturned position to extract the filters; Figures 9, 10, 11 are, respectively, the side view of a bag filter with corresponding detachable basket and the plan views of the coupling device for the bag filter, respectively in the coupled and uncoupled positions; Figures 12, 13 illustrate the lifting device for the basket for the hermetic closure of the bottom end of the agglomeration chamber, respectively, in the raised and lowered positions; Figures 14, 15 illustrate the basket in the two positions, respectively, horizontal and rotated for emptying; Figure 16 is the side view of the basket rotated 180° for dismounting the fluidizing net; Figure 17 is section XVII-XVII of Figure 22 with the components separated, concerning the rapid-locking device of the said net with air seal; Figure 18 is the reflected view of Figure 17 showing the connection between the flanges making up the said locking device; Figures 19, 20 show the locked position of Figures 17, 18; Figure 21 is an enlarged and partially sectioned detail of the support hinge of the trolley, floating in the vertical direction; Figures 22, 23, 24 are top views, respectively, of the basket on the trolley, of its guide rails in the structure and of the two together; Figure 25 is the side view of the empty plant, that is, without powder to be agglomerated, showing the flow lines of the air from inlet to outlet; Figure 26 is the simplified, interrupted and partially sectioned side view of the plant in operating conditions; Figure 27 is an enlarged plan view of the basket containing the powder in the configuration of Figure 16, but in a version with a rapid action locking device for the fluidizing net; Figure 28 is the side view of the basket in Figure 27, in an inclined position for cleaning or inspecting the fluidizing

net; Figure 29 is partial, enlarged and interrupted section XXIX-XXIX of Figure 27; Figure 30 is section XXX-XXX of Figure 27; Figure 31 is a view as in Figure 21, but in the version with the basket as in Figure 27.

The figures show: L, S, (Figure 1) respectively, the binding liquid (for example, water and sugar) and the corresponding atomized phase by means of compressed air at pressures ranging from approximately 2 bar to approximately 7 bar; P1, C, respectively, the powder to be granulated (for example, high density whey proteins) placed in the corresponding container or basket; A1, F1, R, respectively, the outside air, the filtering station and the heating station; G, the agglomeration chamber into which flow, respectively, the powder to be agglomerated P1, outside air A1, filtered and heated, atomized binding liquid L; A2, the spent air, which, after having heated granulated product P2 in agglomeration chamber G, is filtered in F2 and reintroduced into atmosphere A2; 1, (Figure 2) the intermediate tubular element, constituting the casing of the agglomeration chamber, having appendages 2, advantageously horizontal, cylindrical and positioned opposite each other, rotationally coupled to supports 3, for example, Y shaped, fixed to risers 4, of frame 5 (Figure 3); 6, apertures in tubular element 1 to enable nozzles to be inserted in it for the injection of compressed air and binding liquid for the agglomeration of the powder; 7, an opening for loading the powder or for extracting samples; 8, an inspection hatch; 9, rotating means, preferably a motor reducer, for the rotation of element 1 around appendages 2; 10, a cover, or cap, fixed in a detachable manner to top flange 11 of element 1 by means of first lifting means, preferably pneumatic cylinders, 12 having guides to centre the cover on closure; 13, a tubular joint connecting cover 10 to extraction pipe 14 via flexible joint 15; 16, the motorized ventilating unit to create a vacuum, for example at 1/10 bar, in agglomeration chamber G, defined inside the tubular casing 1; 17, the exhaust pipe for spent air A3; 18, the handles of basket C, having inspection opening 19; 20, a manifold for heated air A1 to channel it towards agglomeration chamber G, through net 21 of basket C that fluidizes the product during agglomeration; 22, a trolley on which basket C is mounted, detachable at least in the vertical direction; 23, second lifting means, preferably actuation devices that lift manifold 20 of air A1 and basket C separating it from corresponding trolley 22 so as to hermetically seal the lower opening of casing 1, such devices consisting of, for example, pneumatic cylinders; 24, (Figure 3) a compressed air reservoir for cleaning bag filters 25; 26, solenoid valves to activate in sequence the cleaning cycle of bag filters 25; 27, a vacuum gauge inside chamber G; 28, a pump for the binding liquid, advantageously peristaltic, for the injection of liquid L in chamber G and, during the phase of inverted sense of rotation, to prevent liquid from dripping from the atomizing nozzle of the dispenser; 29, a reservoir for binding liquid L; 30, a heat exchanger to heat the air; 31, a filter element to filter outside air A1; 32, an electrical junction box; 33, auxiliary filter elements to filter the compressed air for the atomizing dispenser, for cleaning bag filters 25 and for the supply to the pneumatic cylinders; 34, (Figures 9, 10, 11) a bag filter to filter the air exiting granulation chamber G; 35, a cylindrical wire frame support inside the filter bag serving as stiffener; 36, a plastic positioning element to anchor the support, by means of upper diametric traverse 37 of support 35, to support plate 38 that carries the bag filters 34: the extremities of traverse 37 being such as to cooperate with a pair of opposing grooves, not shown, of elements 36, so as to achieve a bayonet coupling; 39, air seals between bag 34 and corresponding insertion hole in plate 38.

Basket C consists of body 40a, preferably in the shape of a truncated cone, having, at its minor base, flange 41 to which is coupled in a detachable manner, for example, by means of eye bolts 43, external peripheral ring 42 supporting net 21: the eye bolts, or other analogous coupling devices, lock ring 42 of net 21 against flange 41, within corresponding annular seats present in said flange and in said locking ring, by means of detachable locking ring 40.

Locking ring 40 has a number of spokes 40b to limit the deformation of net 20 with the weight of the material contained in basket C.

The eye bolts, having a screw stem as shown in Figure 19, can have one end having a hinged coupling with locking ring 40 in peripheral protruding supports 43a, the other end being insertable in corresponding U shaped appendages 43b protruding outwards from flange 41.

Basket C also has cylindrical appendages 44, protruding outwards, preferably with aligned horizontal axes, to support the basket on horizontal arms 45, parallel with one another, of trolley 22.

The part of the arms, preferably the ends, that couple with appendages 44 have seats 44a coupled with the external shape of appendages 44, so as to allow the rotation in the seats of the appendages: in the example illustrated in Figure 21, seats 44a are semi-cylindrical.

At least one of the appendages 44 has a reference means for setting the angular position of basket C in relation to trolley 22: such reference means can advantageously comprise, simply and effectively, removable locating pin 46 inserted from above in vertical through hole 46a in each appendage 44 and in hole 46b aligned with in corresponding arm 45.

In a further version, shown in Figure 31, the means of reference comprise a number of through holes, shown as 46a, 46c, in appendage 44, having coinciding axes and forming between them angle A corresponding to the inclination of basket C when it is positioned with an inclination of approximately 90° to the horizontal for the substitution of the net, as illustrated in Figure 28; holes 46a, 46b can be positioned in transverse planes that are parallel to each other in order to avoid excessive weakening of appendage 44.

In this last case hole 46b may consist of a slot with a length sufficient to enable the insertion of pin 46 in

anyone of holes 46a, 46b.

It is to be noted that the locking ring can be hinged to flange 41 by means of a pair of hinges 50, positioned peripherally on the minor base of the truncated cone body 40a.

Each hinge 50 consists of a bracket 51 fixed peripherally to locking ring 40, having a central portion that couples with a hooked seat 53 correspondingly located on flange 41 of container C. With such an arrangement it is possible to rapidly remove locking ring 40 from flange 41.

The Figures also show: 47, the positioning guides for trolley 22 with respect to risers 4.

Operation is as follows: having filled basket C with the quantity of powder or granules that correspond to a load, air circulation is activated to set up a vacuum in agglomeration chamber G by activating motorized ventilator 16, thereby initiating fluidization, at first executed dry for a period sufficient to heat up the load; then the binding liquid is supplied to the atomizing dispensers by activating peristaltic pump 28 until the desired size of granule is obtained: a complete cycle possibly consisting of a number of iterations of the phases described above, executed with manual commands or automatically.

The hermetic closure of agglomeration chamber G is achieved by activating cylinders 23 that lift air funnel 20 so that its upper ledge comes into contact with bottom flange 40 of basket C and, continuing upwards, lifting also the basket until its upper rim creates a sealing contact with the lower rim of casing 1 of agglomeration chamber G with perfect centering due to guides 47; lowering cylinders 23 disengages the casing of the chamber to enable the basket to be removed or in preparation for the overturning manoeuvre, after cap 10 has been lifted by activating cylinders 12.

It is to be noted that at the end of the lifting stroke of basket C, the lower extremity of each floating pin 46 may advantageously be still in a position to act as guide when lowering the basket at the end of the granulation cycle. This being achieved by determining a length for each pin that is sufficient to prevent it from being pulled out of hole 46b when basket C is in its uppermost position.

With the intermediate section of the casing of agglomeration chamber G separated it is possible to rotate it on a horizontal axis passing through supports 3, for example by means of a motor reducer, in order to overturn it.

The central portion of the casing of a silo for storing powdered, or granulate, materials (not shown) can be rotated in an entirely analogous manner, when it is coupled detachably to a closing cover, raised by means of actuators analogous to cylinders 12, and to a base structure for the extraction of the product, for example consisting of a screw conveyor, vertically coupled to the lower rim of the central portion by means of actuators analogous to cylinders 23.

The substitution of fluidizing net 21 is achieved after disengaging eye bolts 43 from their seats on the periphery of flange 41 so as to free external support ring 42 from the net; before this, each pin 46 has to be extracted from hinge pins 44 for the subsequent rotation of basket C on hinge pins 44 so as to position the net on the top side for convenient disassembly; pins 46 are then reinserted to hold the basket in position until the substitution of the net has been completed.

Claims

1. A plant for the treatment of powders, or granules, in particular for the food, chemical or pharmaceutical industries, comprising a tubular casing coupled at its lower end to a base structure and at its top end to a closing cover (10) of an air filter unit characterized in that the tubular casing (1) is detachable from the base structure (C) and the cover (10) so that it can be rotated around a horizontal axis.

2. A plant, as claimed in claim 1, wherein the tubular element (1) is provided with lateral appendages (2) that form a rotational coupling in supports (3) fixed to the risers (4) of a frame (5).

3. A plant, as claimed in claim 2, wherein first lifting means (12) are fixed to said risers (4) for the controlled lifting of the cover (10): the exhaust tube of the filtered air having a flexible coupling (15).

4. A plant, as claimed in claim 3, wherein attached to the risers (4) rotating means (9) are provided to rotate the tubular element (1).

5. A plant, as claimed in claims 1 and 3, wherein second lifting means (23) to lift the base structure (C) are provided

6. A plant, as claimed in claim 1, wherein said base structure comprises a basket container (C) that can be coupled, in a guided vertically floating connection, to the lower end of the tubular element (1).

7. A plant, as claimed in claim 6, wherein said basket container has on its sides a pair of appendages (44) that fit in a detachable manner in seats (44a) of arms (45) of a trolley (22).

8. A plant, as claimed in claim 7, wherein at least one of the said appendages (44) cooperates with reference means (46, 46a, 46c) for setting the angular position of basket (C).

9. A plant, as claimed in claim 8, wherein said reference means comprises at least one pin (46) that may be inserted into at least one hole in the appendage (44) aligned with a corresponding at least one hole (46a, 46c) in the arm (45).

10. A plant, as claimed in claim 9, wherein the pin (46) has a length which is greater than the sum of the transverse dimension of the lateral appendage (44) incremented by a lifting distance of the basket (C).

11. A plant, as claimed in one or more of the preceding claims, wherein a bottom part of the basket (C) has a flange (41) for fixing thereto an external support ring (42) for a net (21) by means of a locking ring (40).

12. A plant, as claimed in claim 11, wherein said locking ring (40) is joined to said flange (41) by hinge means (50).

13. A plant, as claimed in claim 11, wherein the hinge means (50) provides for a detachable locking of the locking ring (40) to the flange (41) by means of brackets (51) inserted in hook slots (53) of the flange.

14. A plant, as claimed in any one of claims 11, 12, 13, wherein the locking ring (40) is coupled to the flange (41) by means of revolving stay bolts (43).

15. A plant, as claimed in claim 11, wherein the bottom part of the basket (C) may be coupled to an air funnel (20) having second lifting means (23) for the simultaneous vertical raising of the basket and funnel.

16. A plant, as claimed claim 1, wherein said filter unit has filters (25) provided with respective removable frames (35) and top side traverses (37) that close with a bayonet coupling in positioning elements (36).

17. A plant, as claimed in claim 7, wherein said trolley (22) has arms (45) which may be inserted in guides (47) to centre the basket (C) close to the lower edge of the tubular element (1).

18. A plant, as claimed in claim 1, wherein said tubular casing (1) includes spraying means for spraying a binding liquid, said spraying means comprising inverting means for inverting the direction of flow of said binding liquid.

19. A plant, as claimed in claim 1, wherein said tubular casing (1) includes spraying means for spraying a binding liquid, said spraying means comprising diverting means for diverting the flow af said binding liquid upstream of an outlet of said flow.

20. A plant, as claimed in claim 1, wherein said tubular casing (1) is connected to an exhaust pipe (17) by means of a motorized ventilating unit (16) suitabe for creating a vacuum inside the tubular casing (1).

21. A plant, as claimed in claim 1, wherein control means are provided for controlling the angular velocity of the ventilating unit (16).

Patentansprüche

1. Anlage zur Behandlung von pulverförmigem oder körnigem Material, insbesondere für die Lebensmittelindustrie, chemische oder pharmazeutische Industrie, ein rohrförmiges Gehäuse aufweisend, das mit seinem unteren Ende mit einem unteren Körper und mit seinem oberen Ende mit einem Verschlußdeckel (10) eines Luftfilters in Verbindung steht, dadurch gekennzeichnet, daß das rohrförmige Gehäuse (1) von dem unteren Körper (C) und dem Deckel (10) abnehmbar ist, so daß es um eine horizontale Achse gedreht werden kann.

2. Anlage nach Anspruch 1, wobei das rohrförmige Element (1) mit seitlichen Ansätzen (2) versehen ist, die in Stützen (3) eine Drehverbindung bilden, welche an die Ständer (4) eines Rahmens (5) befestigt sind.

3. Anlage nach Anspruch 2, wobei erste Hebemittel (12) an den besagten Ständern (4) befestigt sind zum kontrollierten Anheben des Deckels (10) und wobei das Auslaßrohr für die gefilterte Luft eine flexible Verbindungseinheit (15) aufweist.

4. Anlage nach Anspruch 3, wobei zur Drehung des rohrförmigen Elements (1) Drehmittel (9) vorgesehen sind, die an den Ständern (4) befestigt sind.

5. Anlage nach Ansprüchen 1 und 3, wobei zur Anhebung des unteren Körpers (C) zweite Hebemittel (23) vorgesehen sind.

6. Anlage nach Anspruch 1, wobei der besagte untere Körper einen Korbbehälter (C) enthält, der in einer vertikal geführten, beweglichen Verbindung mit dem unteren Ende des rohrförmigen Elements (1) verbunden werden kann.

7. Anlage nach Anspruch 6, wobei der besagte Korbbehälter an seinen Seiten ein Paar von Ansätzen (44) aufweist, die sich trennbar in Sitze (44a) von Armen (45) eines Karrens (22) einfügen.

8. Anlage nach Anspruch 7, wobei wenigstens einer der besagten Ansätze (44) mit Referenzmitteln (46, 46a, 46c) zusammenwirkt zur Einstellung der Winkelstellung des Korbes (C).

9. Anlage nach Anspruch 8, wobei die besagten Referenzmittel wenigstens einen Zapfen (46) enthalten, der in wenigstens eine Öffnung in dem Ansatz (44) einführbar ist, welche sich in einer Linie mit einer entsprechenden, wenigstens einen Öffnung (46a,

46c) in dem Arm (45) befindet.

10. Anlage nach Anspruch 9, wobei der Zapfen (46) eine Länge aufweist, die größer ist als die Summe der Querabmessung des seitlichen Ansatzes (44), erhöht durch einen Anhebeabstand des Korbes (C).

11. Anlage nach einem oder mehreren der vorhergehenden Ansprüche, wobei ein Bodenteil des Korbes (C) einen Flansch (41) aufweist, um an selbigen einen äußeren Stützring (42) für ein Netz (21) über einen Klemmring (40) zu befestigen.

12. Anlage nach Anspruch 11, wobei der besagte Klemmring (40) über Gelenkmittel (50) mit dem besagten Flansch (41) verbunden ist.

13. Anlage nach Anspruch 11, wobei die Gelenkmittel (50) zur lösbaren Blockierung des Klemmringes (40) an dem Flansch (41) dienen mittels Halter (51), welche in hakenförmige Aufnahmen (53) des Flansches eingeführt sind.

14. Anlage nach einem der Ansprüche 11, 12, 13, wobei der Klemmring (40) durch drehbare Stützriegel (43) mit dem Flansch (41) verbunden ist.

15. Anlage nach Anspruch 11, wobei das Bodenteil des Korbes (C) mit einem Luftschacht (20) verbindbar ist, zweite Hebemittel (23) aufweisend zum gleichzeitigen, vertikalen Anheben des Korbes und des Luftschachtes.

16. Anlage nach Anspruch 1, wobei die besagte Filtereinheit Filter (25) aufweist, die mit jeweiligen abnehmbaren Rahmen (35) und oberseitigen Querträgern (37) versehen sind, welche durch einen Bajonettverschluß in Schaltelemente (36) verschließbar sind.

17. Anlage nach Anspruch 7, wobei der besagte Karren (22) Arme (45) aufweist, die in Führungen (47) einführbar sind zur Zentrierung des Korbes (C) dicht an der unteren Kante des rohrförmigen Elementes (1).

18. Anlage nach Anspruch 1, wobei das besagte rohrförmige Gehäuse (1) Sprühmittel enthält zum Sprühen einer Bindeflüssigkeit, wobei die besagten Sprühmittel Umkehrmittel enthalten zur Umkehrung der Flußrichtung der besagten Bindeflüssigkeit.

19. Anlage nach Anspruch 1, wobei das besagte Gehäuse (1) Sprühmittel enthält zum Sprühen einer Bindeflüssigkeit, wobei die besagten Sprühmittel Ablenkmittel enthalten zur Ablenkung des Flusses der besagten Bindeflüssigkeit stromaufwärts eines Auslasses des besagten Flusses.

20. Anlage nach Anspruch 1, wobei das besagte rohrförmige Gehäuse (1) mittels einer motorisierten Lüftungseinheit (16) mit einer Austrittsleitung (17) verbunden ist, wobei die besagte Lüftungseinheit (16) zur Schaffung eines Vakuums innerhalb des rohrförmigen Gehäuses (1) geeignet ist.

21. Anlage nach Anspruch 1, wobei Steuermittel vorgesehen sind zur Steuerung der Winkelgeschwindigkeit der Lüftungseinheit (16).

Revendications

1. Une installation pour le traitement de poudres, ou de granulés, en particulier pour les industries alimentaires, chimiques ou pharmaceutiques, comprenant un conteneur tubulaire couplé sur sa partie inférieure à une structure de base, et sur sa partie supérieure à un couvercle de fermeture (10) d'une unité de filtrage de l'air, caractérisé en ce que le conteneur tubulaire (1) est détachable de la structure de base (C) et du couvercle (10) de manière à ce qu'il puisse être pivoté autour d'un axe horizontal.

2. Une installation, selon la revendication 1, dans laquelle le conteneur tubulaire 1 est équipé d'appendices latéraux (2) formant une liaison en rotation avec des supports (3) fixés aux montants (4) d'un cadre (5).

3. Une installation, selon la revendication 2, dans laquelle les premiers moyens de soulèvement (12) sont fixés auxdits montants (4) pour le soulèvement contrôlé du couvercle (10): le tuyau de sortie de l'air filtrée ayant un accouplement flexible (15).

4. Une installation, selon la revendication 3, dans laquelle des moyens de rotation (9), fixés sur les montants (4), servent à mettre en rotation le conteneur tubulaire (1).

5. Une installation, selon les revendications 1 et 3, dans laquelles les seconds moyens de soulèvement (23) servent à soulever la structure de base (C).

6. Une installation, selon la revendication 1, dans laquelle ladite structure de base comprend un conteneur conique (C) pouvant être accouplé, dans une liaison de guidage verticale flottante, à l'extrémité inférieure du conteneur tubulaire (1).

7. Une installation, selon la revendication 6, dans laquelle ledit conteneur conique est équipé sur ses côtés d'une paire d'appendices (44) qui s'engagent de façon détachable dans des gorges (44a) des bras (45) d'un charriot (22).

8. Une installation, selon la revendication 7, dans laquelle au moins un desdits appendices (44) opère en collaboration avec des moyens de référence (46, 46a, 46c) pour définir la position angulaire du conteneur conique (C).

9. Une installation, selon la revendication 8, dans laquelle lesdits moyens de référence comprennent au moins une cheville (46) devant être insérée dans au moins un trou de l'appendice (44) aligné avec au moins un trou correspondant (46a, 46c) du bras (45).

10. Une installation, selon la revendication 9, dans laquelle la cheville (46) a une longueur supérieure à la somme de la dimension transversale de l'appendice latéral (44) et de la distance de soulèvement du container conique (C).

11. Une installation, selon une où plus des revendications précédentes, dans laquelle une partie supérieure du container conique © est équipée d'une flange (41) dans laquelle est fixé, au moyen d'un collier de blocage (40), un collier de support externe d'une grille (21).

12. Une installation, selon la revendication 11, dans laquelle ledit collier de blocage (40) est lié à ladite flange (41) par des charnières (50).

13. Une installation, selon la revendication 11, dans laquelle les charnières (50) forment un organe démontable de blocage du collier de blocage (40) sur la flange (41), au moyen de supports (51) insérés dans des fentes en forme de crochets (53) de la flange.

14. Une installation, selon n'importe laquelle des revendications 11, 12 ou 13, dans laquelle le collier de blocage (40) est accouplé à la flange (41) au moyen de verrous pivotants (43).

15. Une installation, selon la revendication 11, dans laquelle la partie inférieure du conteneur conique (C) est couplée à une cheminée à air (20) équipée de seconds moyens de soulèvement (23) pour le soulèvement vertical simultané du conteneur et de la cheminée.

16. Une installation, selon la revendication 1, dans laquelle ladite unité de filtrage est pourvue de filtres (25) équipés avec des montures amovibles respectives (35) et des traverses supérieures (37) qui se fixent dans des éléments de positionnement (36) au moyens d'un accouplement à bayonnette.

17. Une installation, selon la revendication 7, dans laquelle ledit charriot (22) est équipé de bras (45) qui sont insérés dans des guides (47) afin de centrer le conteneur conique (C), fixé à l'extrémité inférieure du conteneur tubulaire (1).

18. Une installation, selon la revendication 1, dans laquelle ledit conteneur tubulaire (1) comprend des moyens de pulvérisation servant à pulvériser un liquide liant, lesdits moyens de pulvérisation comprenant des invertisseurs servant à inverser la direction du flux dudit liquide liant.

19. Une installation, selon la revendication 1, dans laquelle ledit conteneur tubulaire (1) comprend des moyens de pulvérisation servant à pulvériser un liquide liant, lesdits moyens de pulvérisation comprenant des moyens de détournement servant à détourner le flux dudit liquide liant en amont de la sortie dudit flux.

20. Une installation, selon la revendication 1, dans laquelle le conteneur tubulaire (1) est relié à un tuyau d'échappement (17) recrachant l'air aspiré par une unité motorisée de ventilation (16) susceptible de créer le vide à l'intérieur du conteneur tubulaire (1).

21. Une installation, selon la revendication 1, dans laquelle sont disposés des moyens de contrôle permettant le contrôle de la vitesse angulaire de l'unité de ventilation (16).

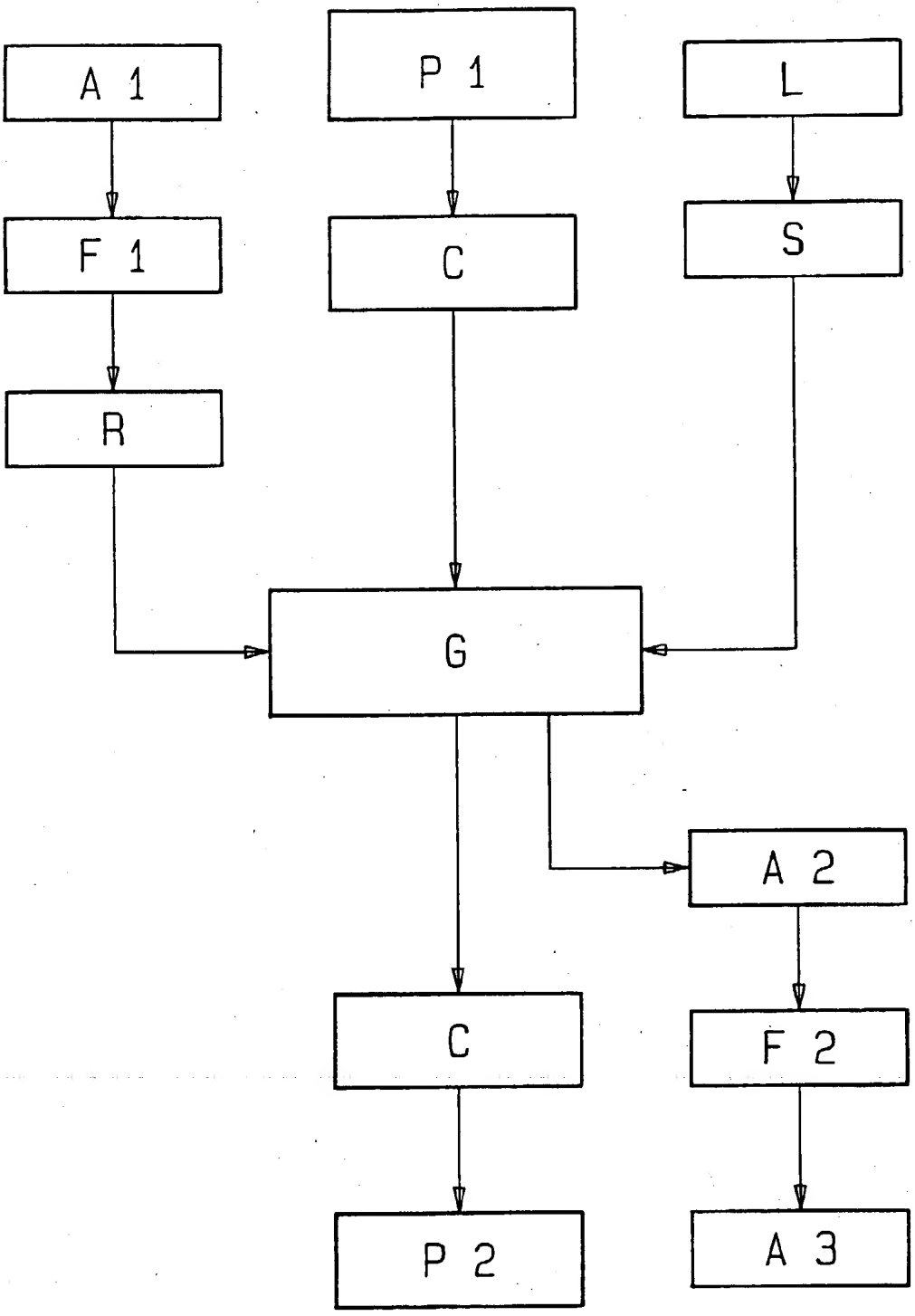


FIG.1

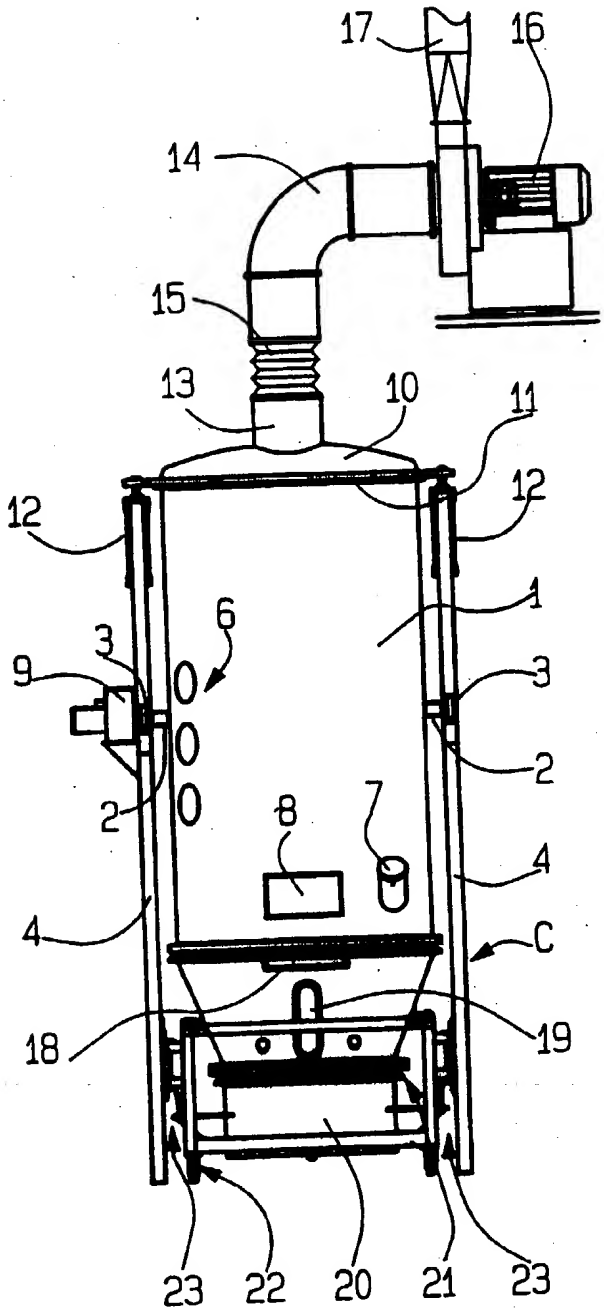


FIG.2

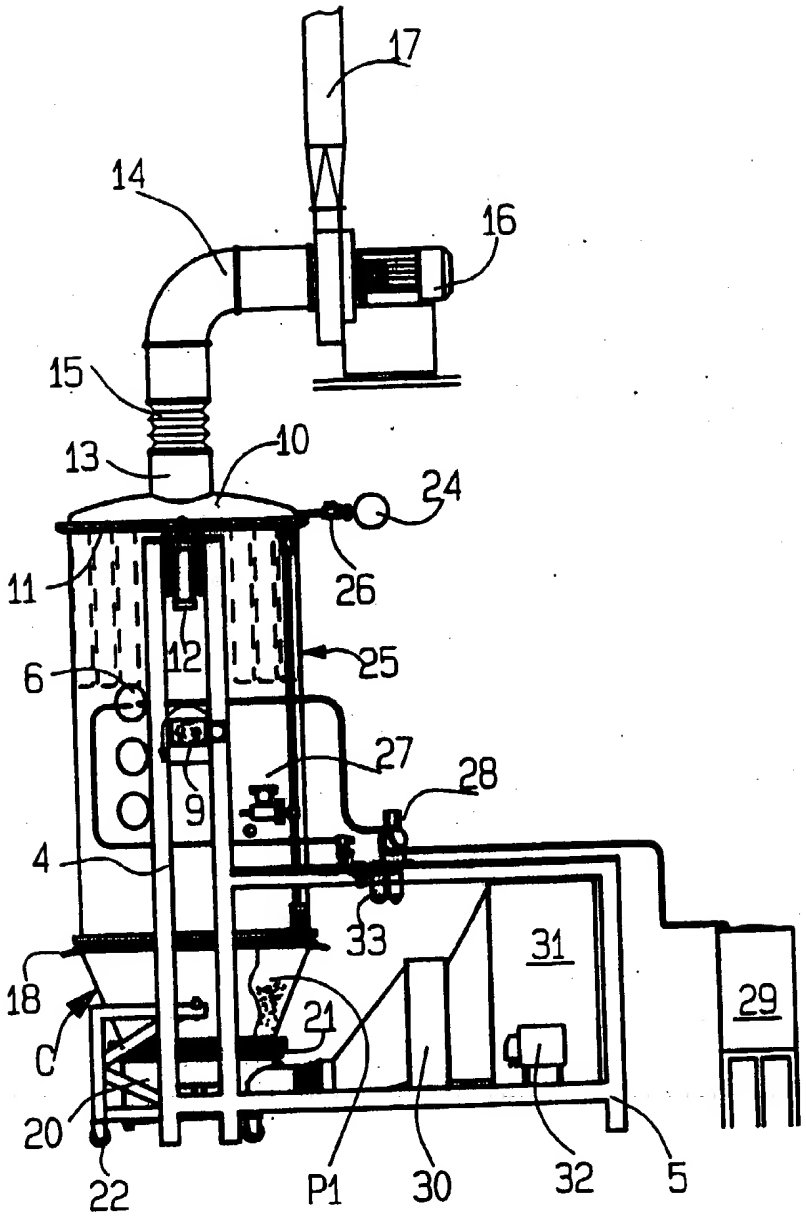

17
14
16
15
13
10
24
11
26
12
25
6
27
28
9
4
33
31
29
18
21
C
20
22
P1
30
32
5

FIG.3

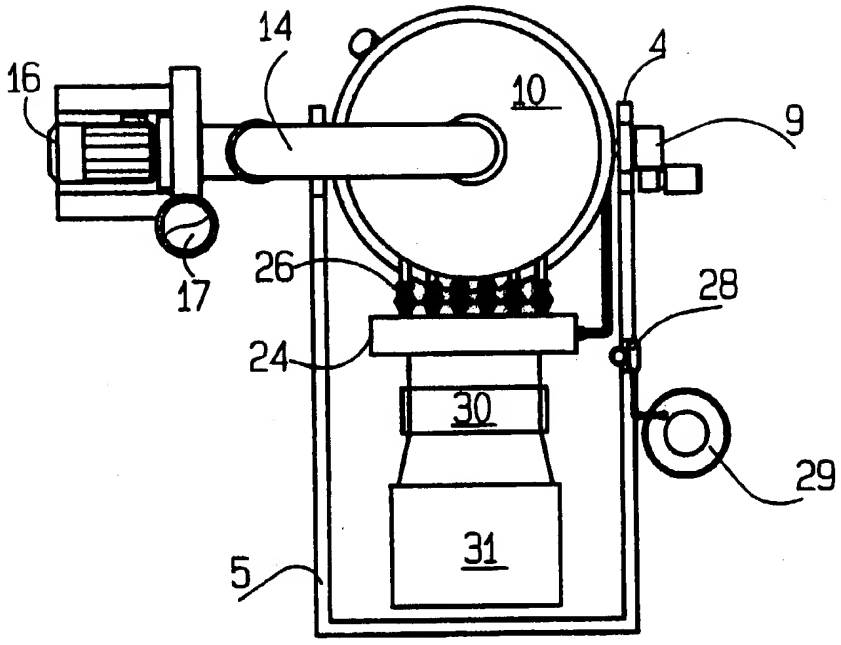


FIG.4

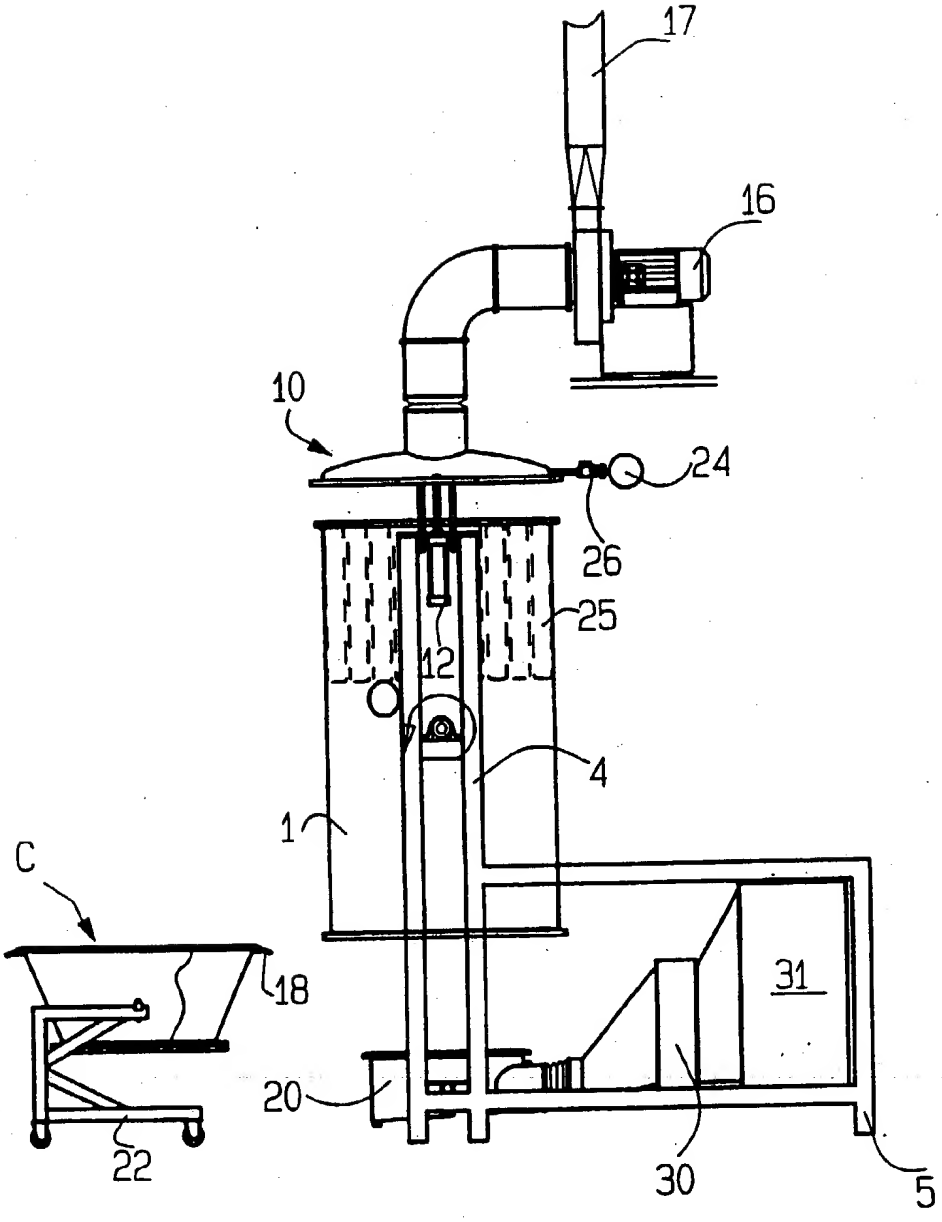


FIG.5

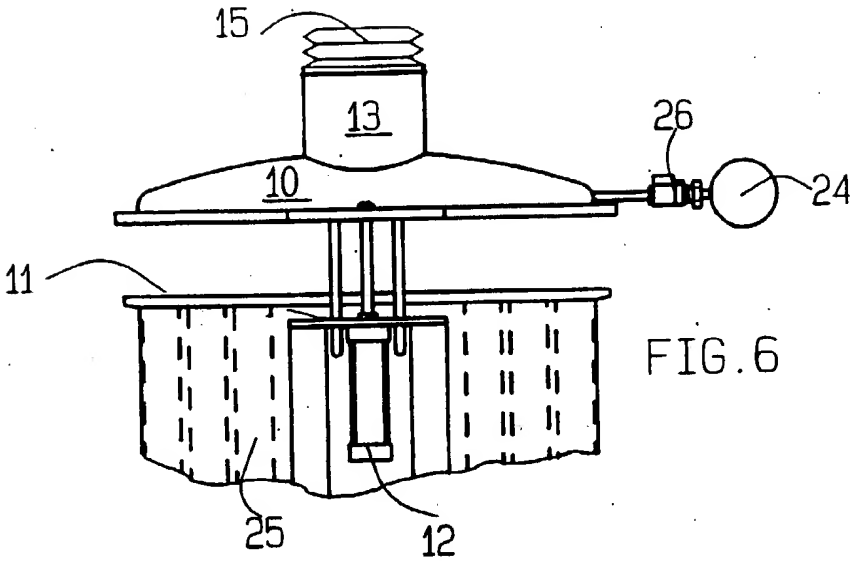


FIG.6

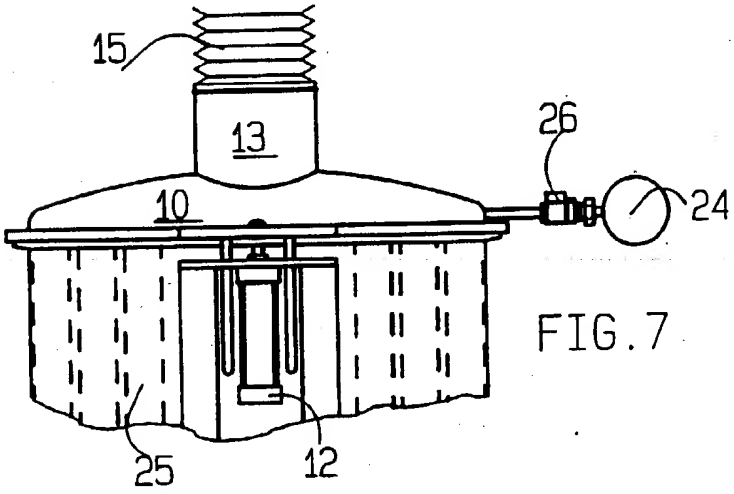


FIG.7

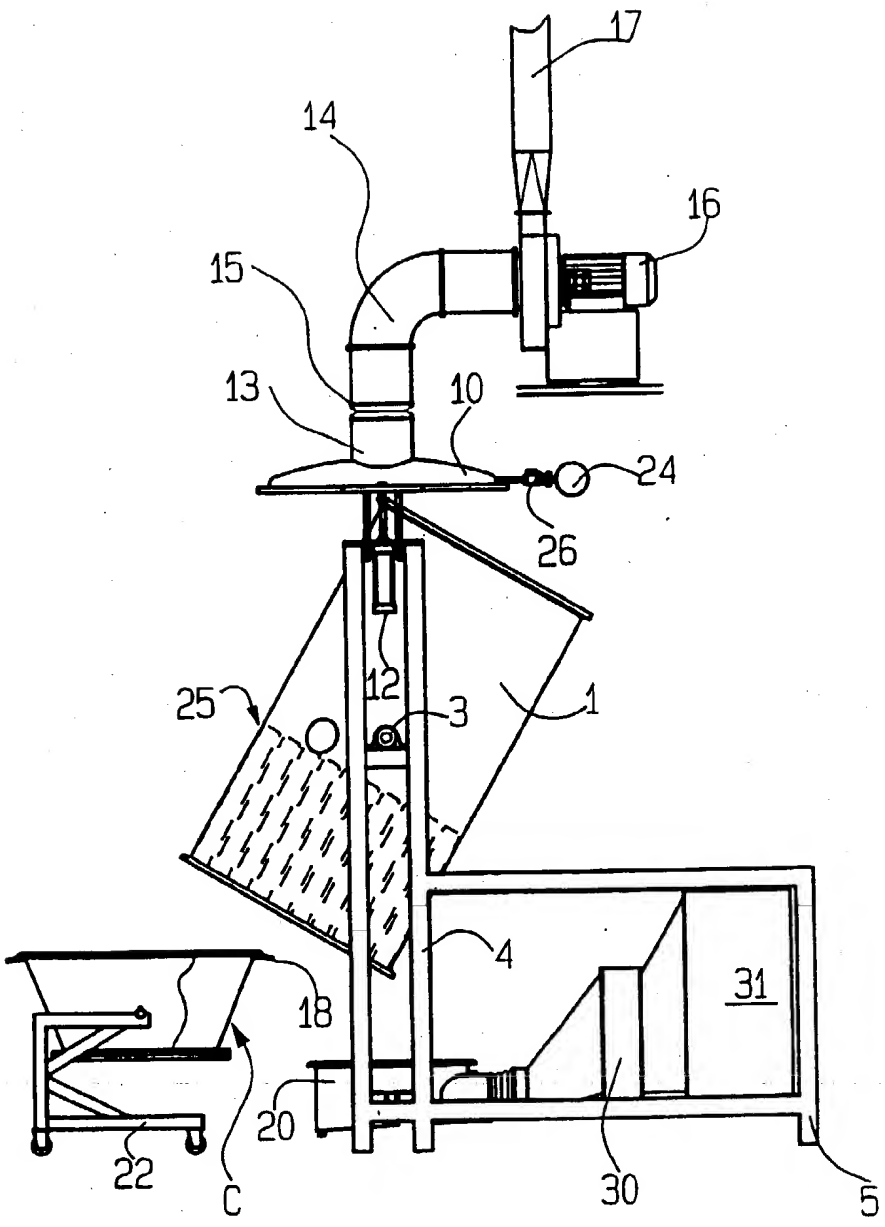
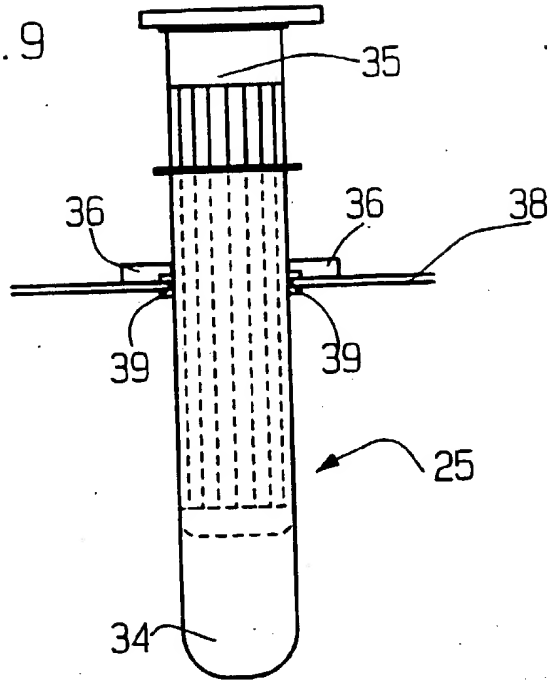


FIG.8

FIG.9



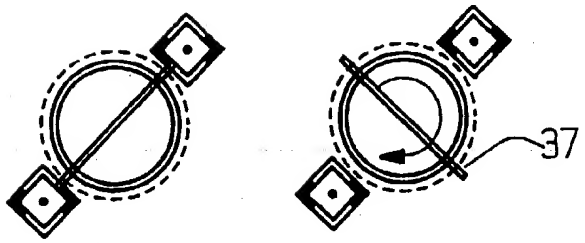


FIG.10

FIG.11

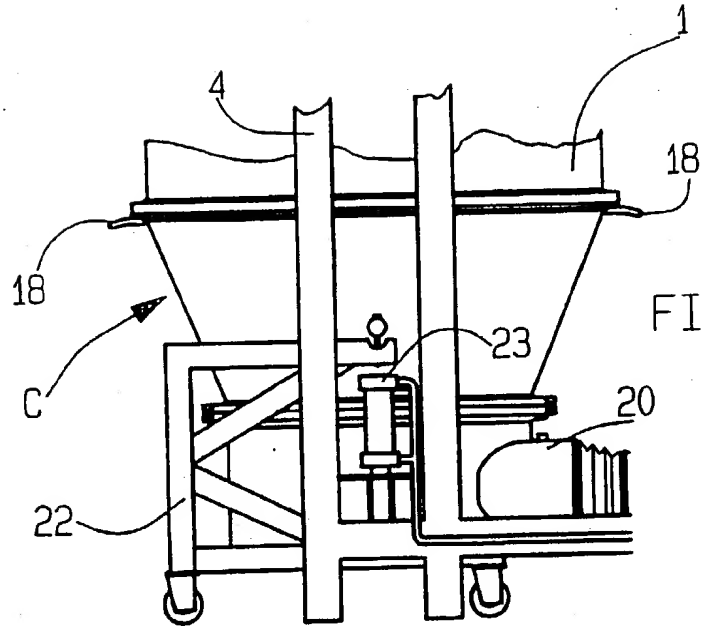


FIG.12

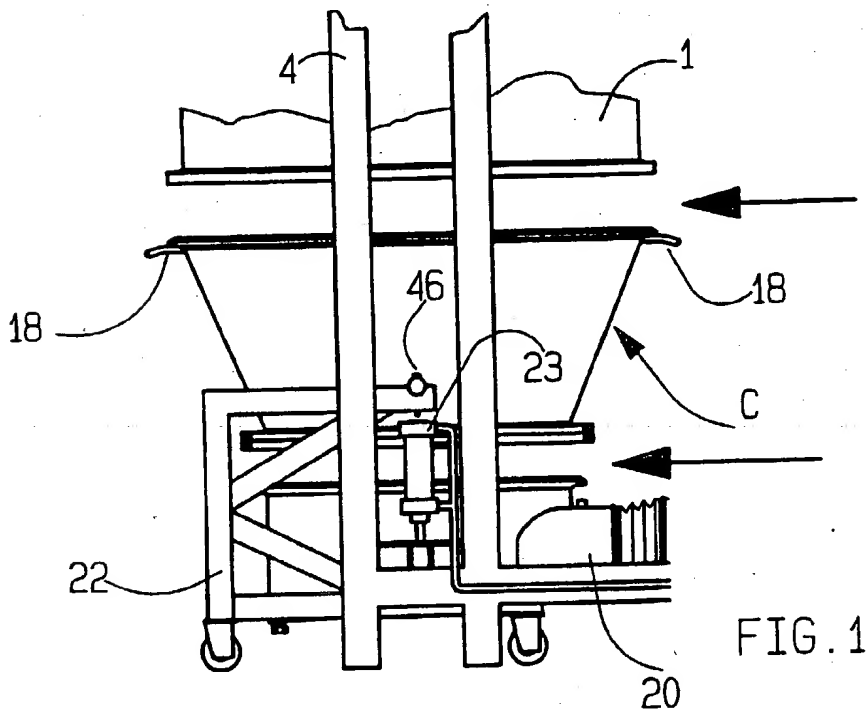


FIG.13

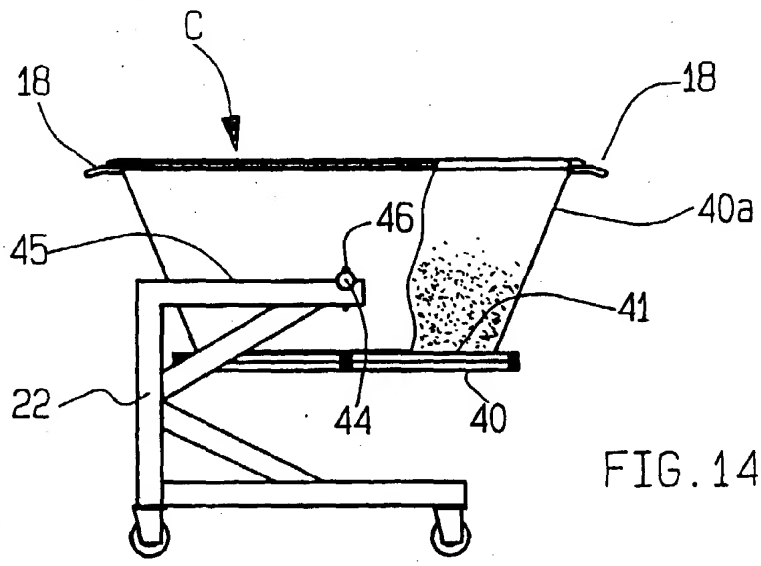


FIG.14

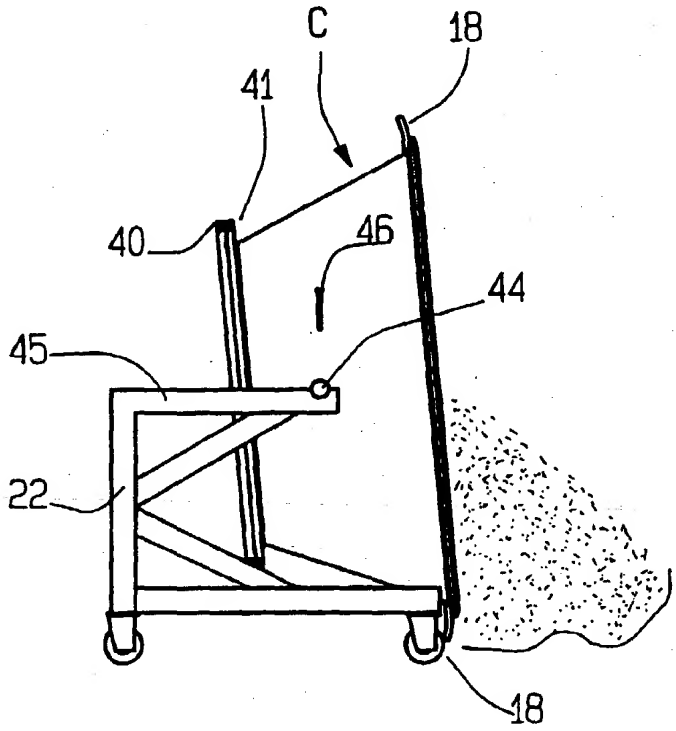


FIG.15

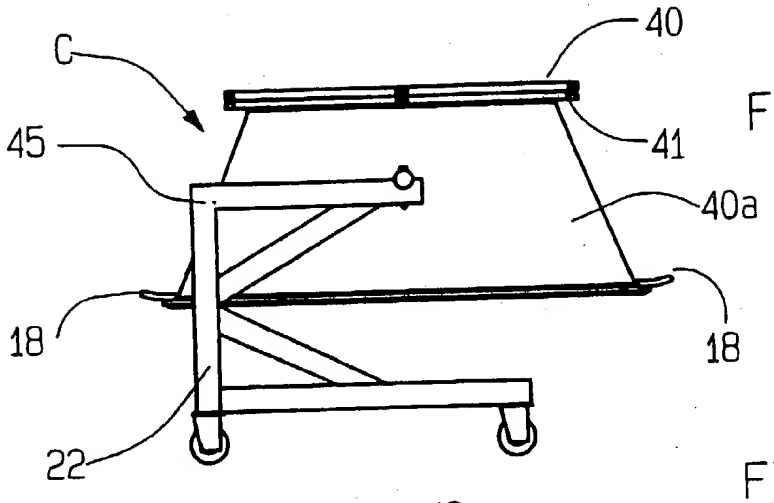


FIG.16

FIG.17

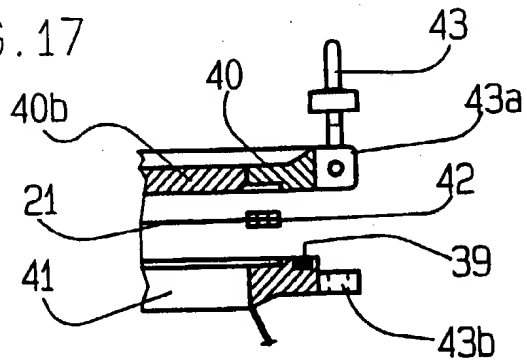
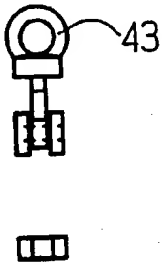


FIG.18



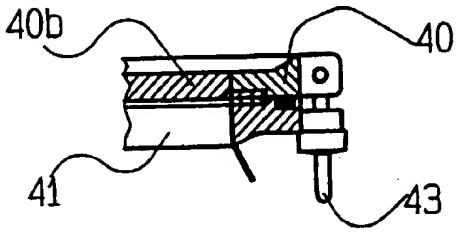


FIG.19

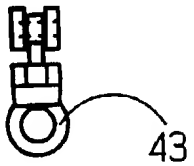


FIG.20

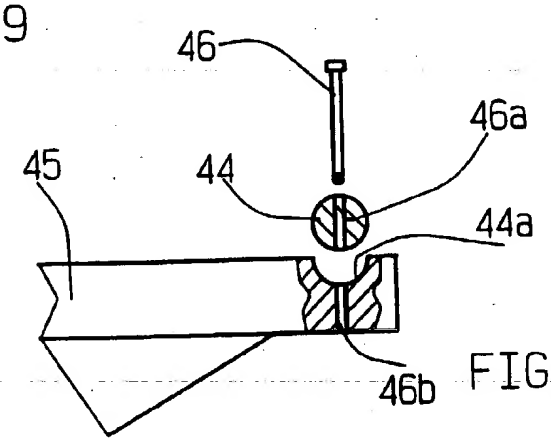


FIG.21

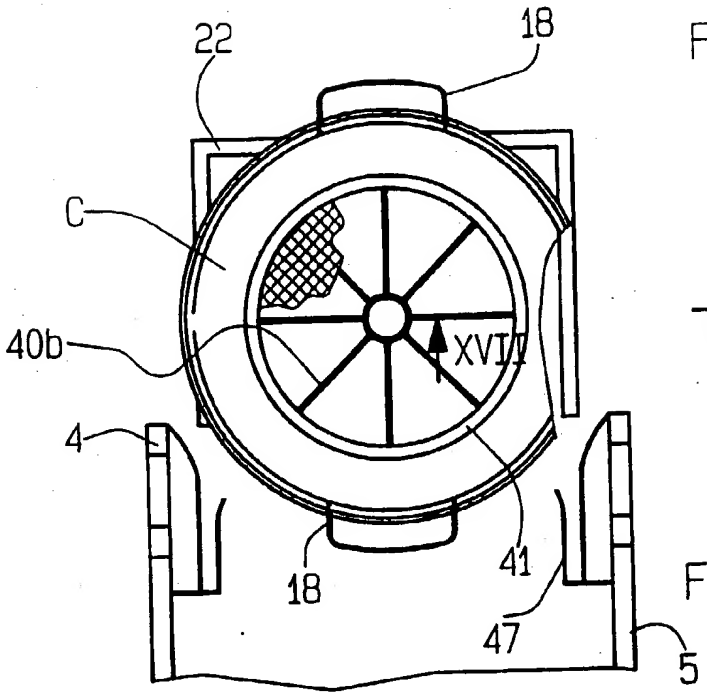


FIG.22

FIG.23

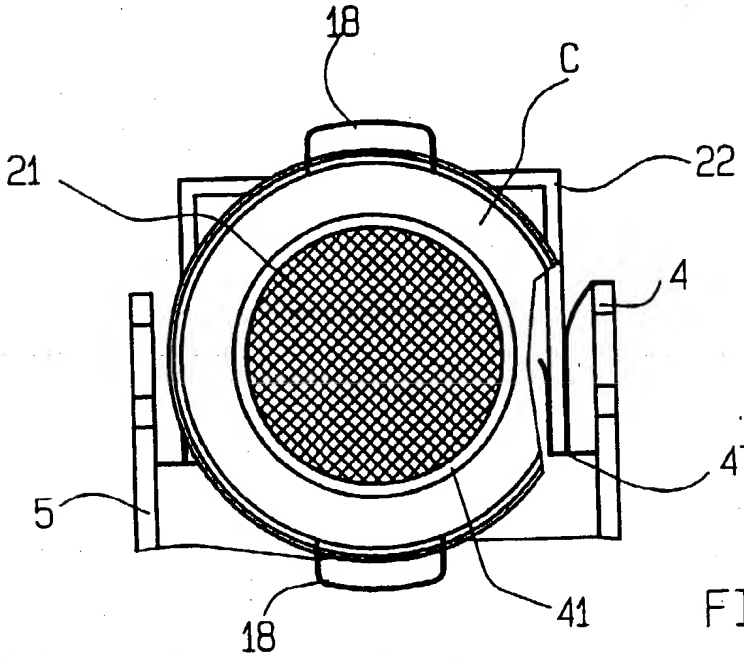


FIG.24

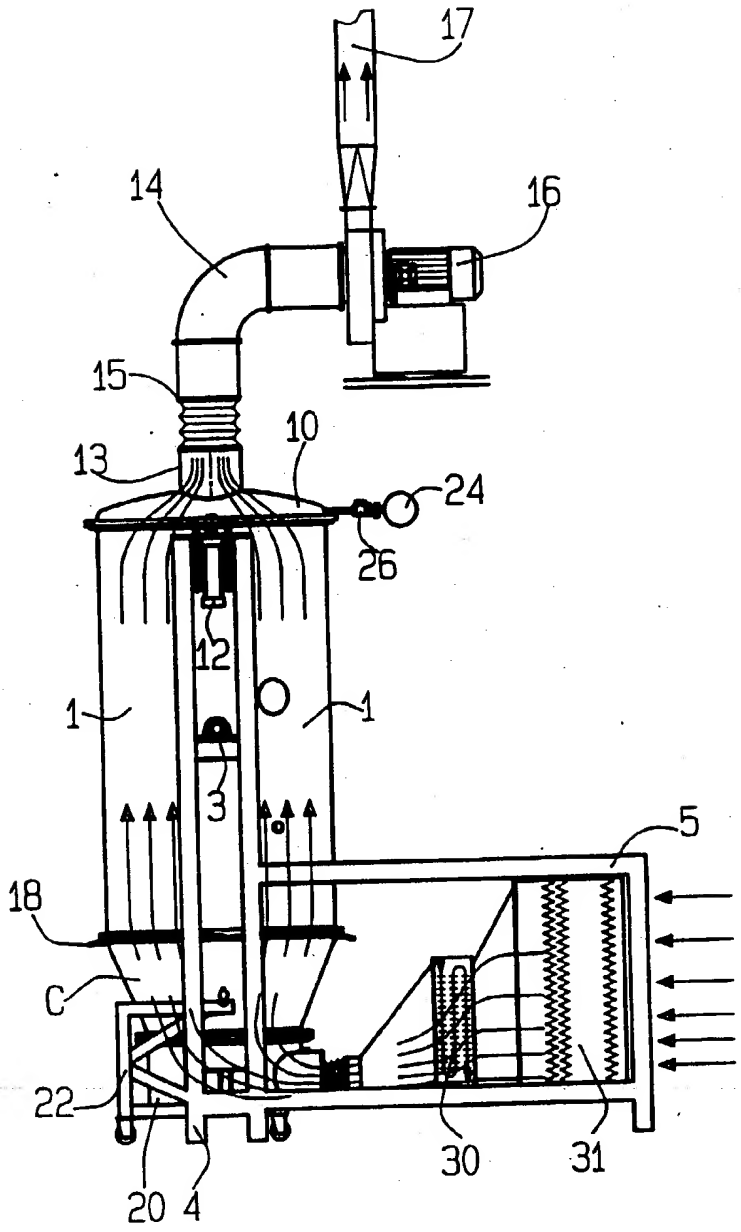


FIG.25

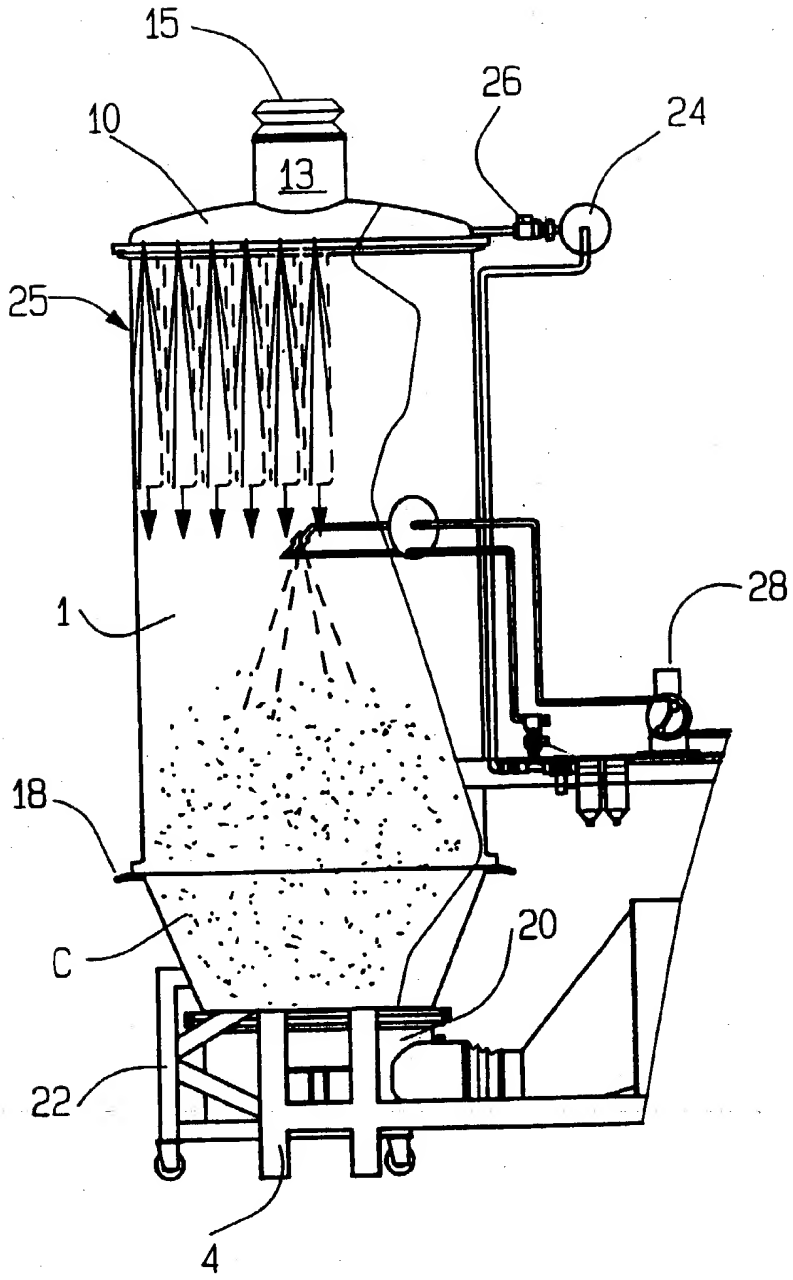


FIG.26

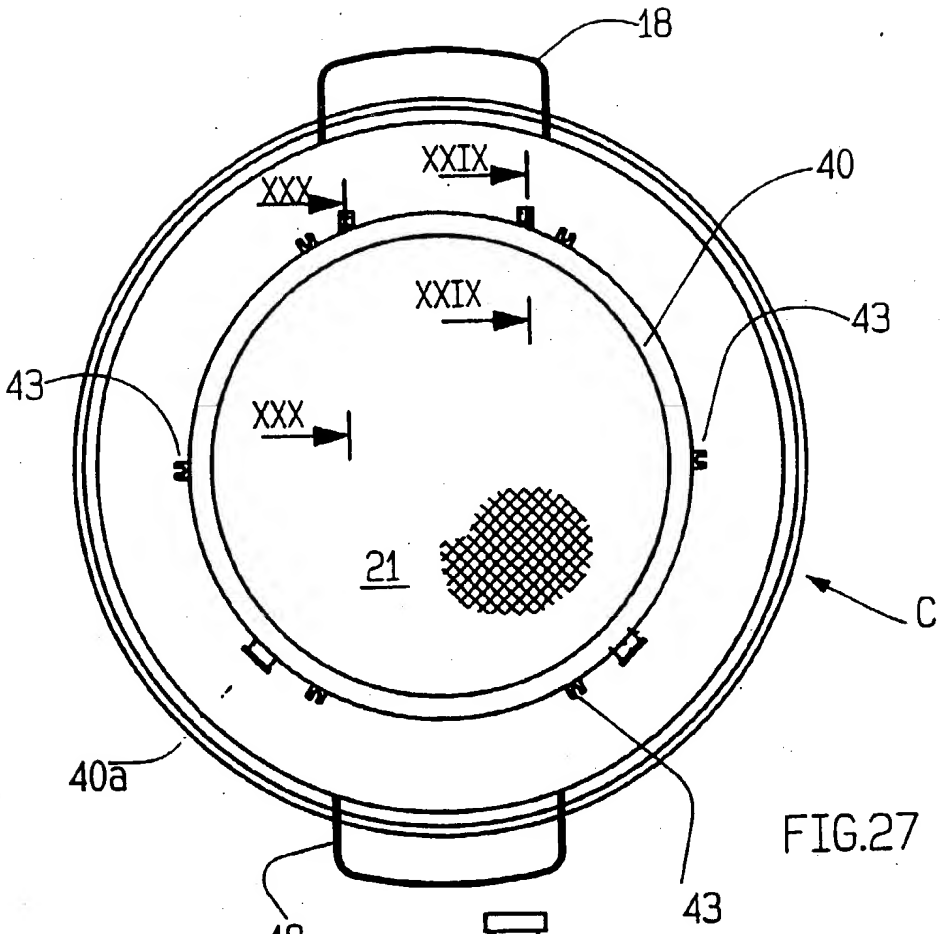


FIG.27

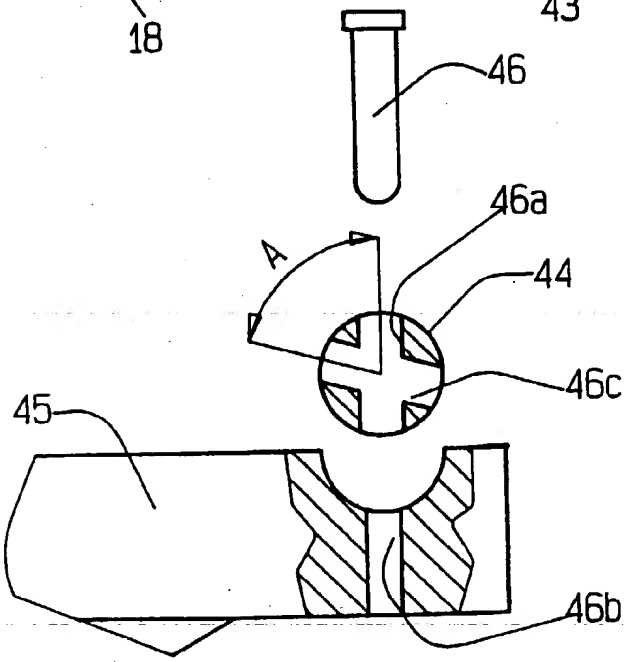


FIG.31

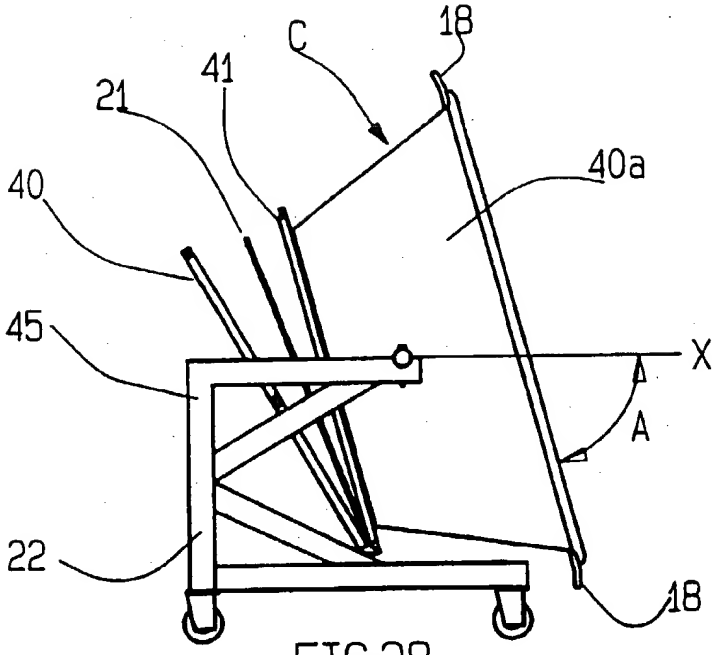


FIG.28

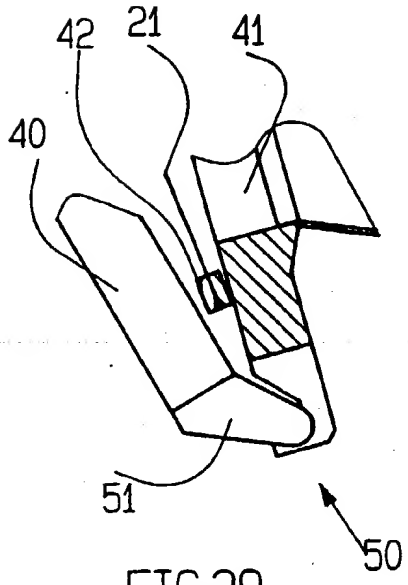


FIG.29

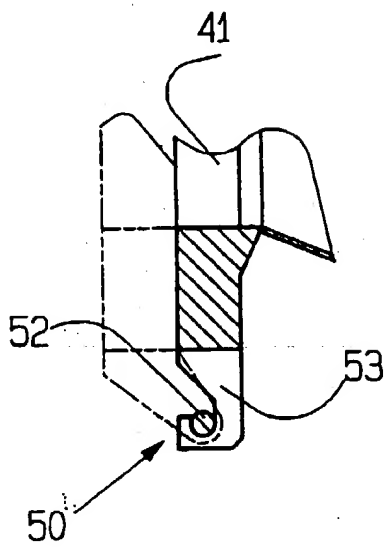


FIG.30

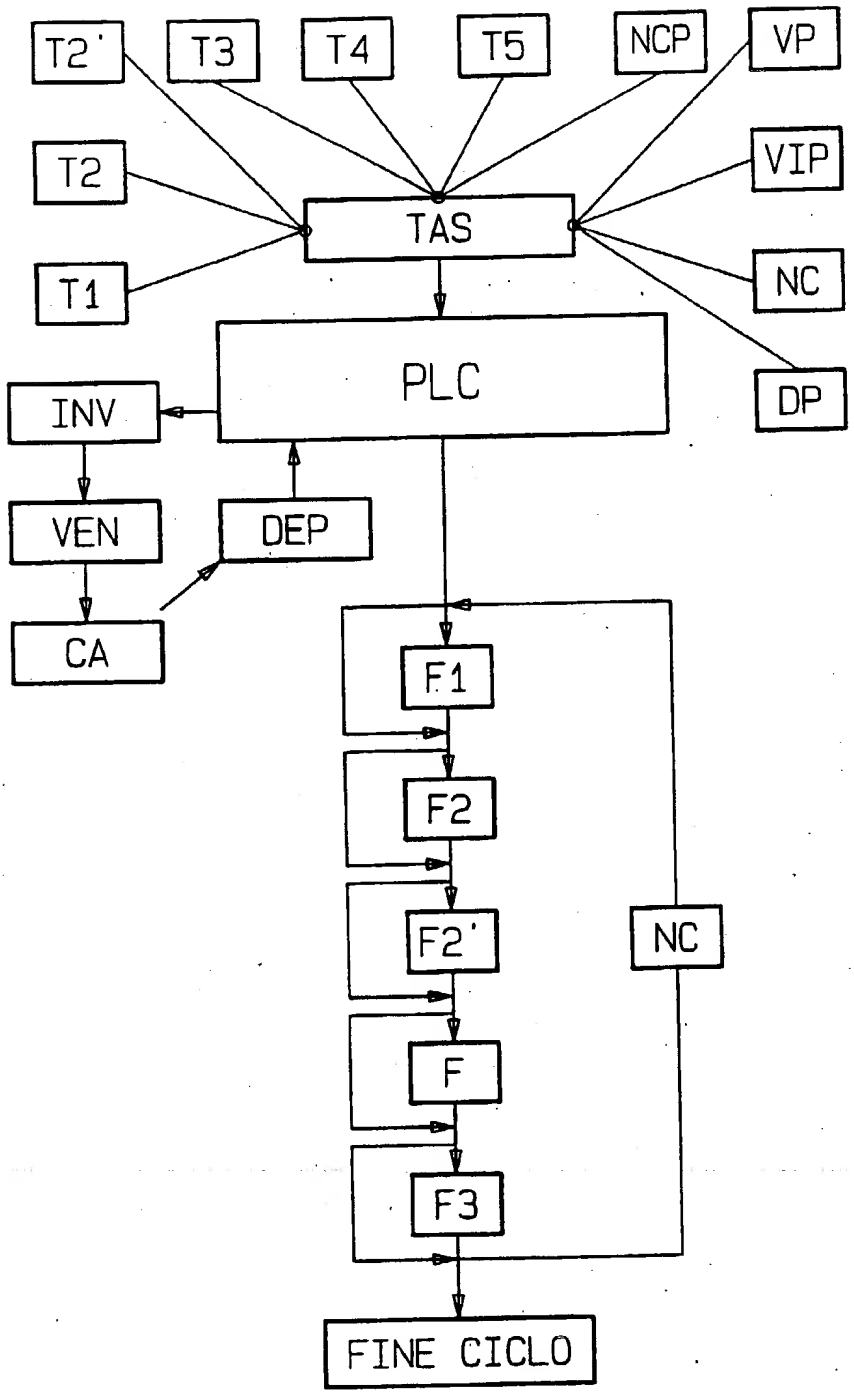

T2'
T3
T4
T5
NCP
VP
T2
VIP
TAS
T1
NC
PLC
DP
INV
VEN
DEP
CA
F1
F2
F2'
NC
F
F3
FINE CICLO

FIG.32

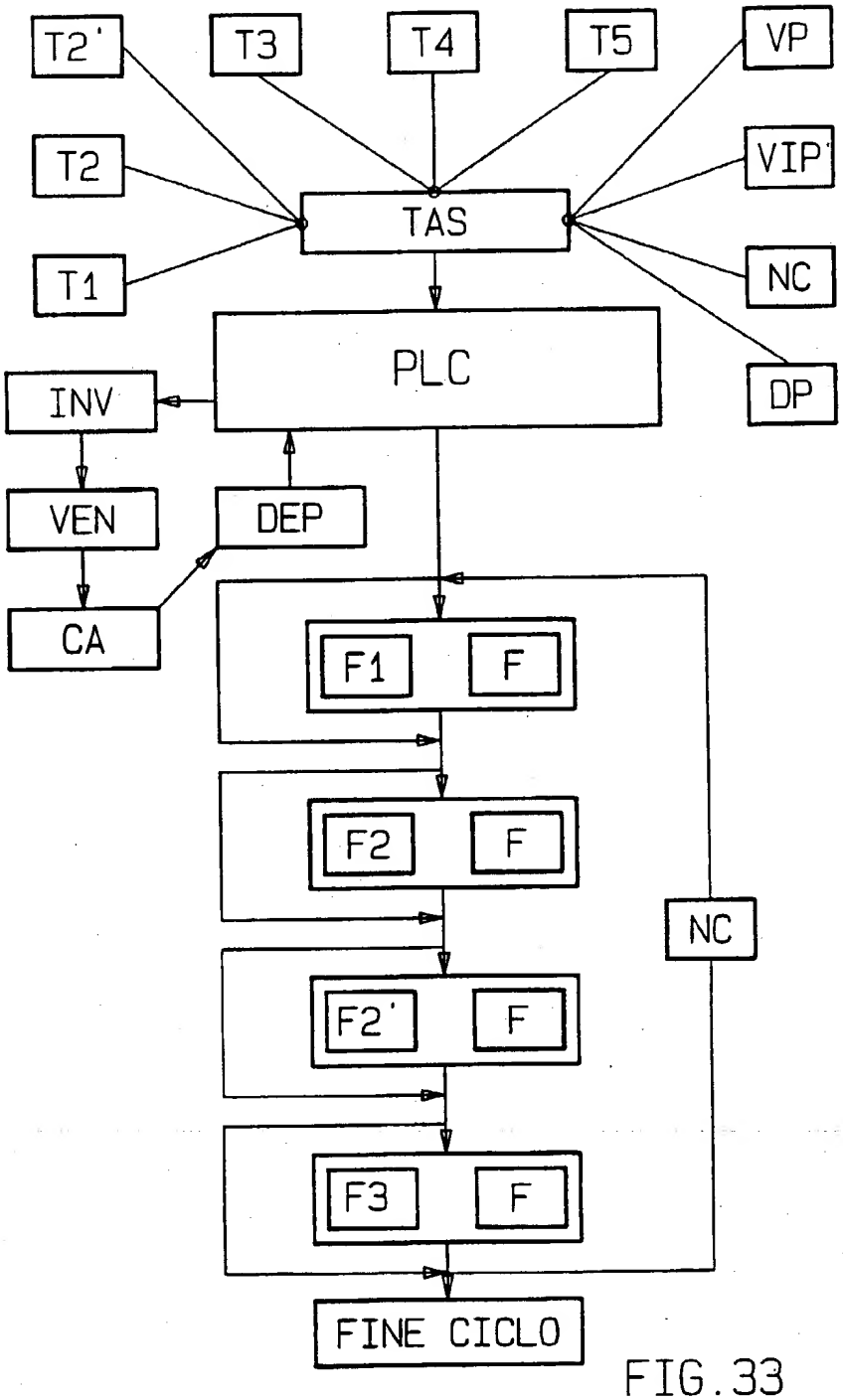

T2'
T3
T4
T5
VP
T2
VIP'
TAS
T1
NC
PLC
DP
INV
VEN
DEP
CA
F1
F
F2
F
NC
F2'
F
F3
F
FINE CICLO

FIG.33

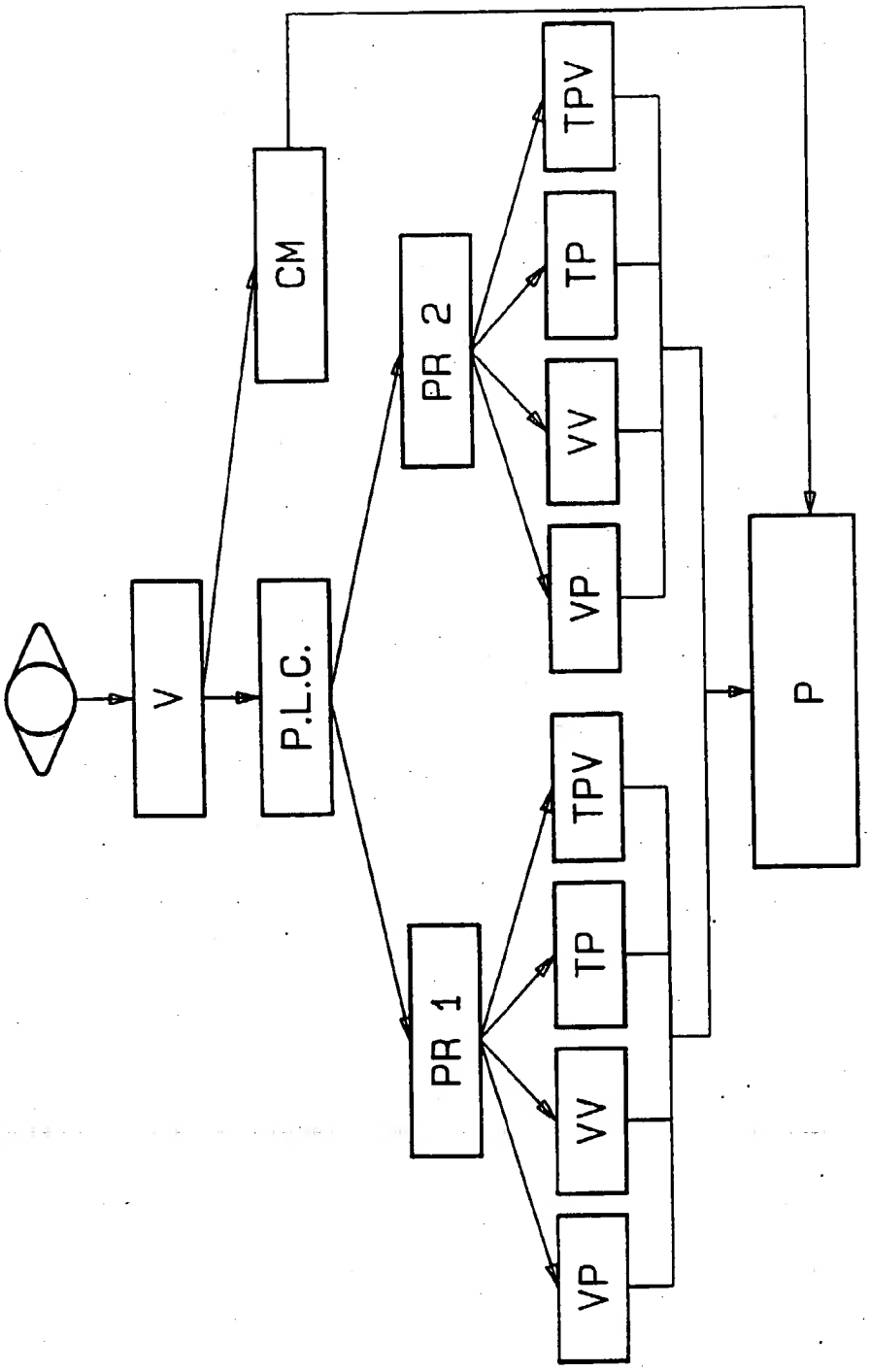


FIG.34